

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Cancelled).

Claim 2 (Currently Amended): ~~The magnetoresistance effect element according to claim 1~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein

the alloy includes at least one element selected from the first group consisting of silver, gold, platinum, palladium, iridium, osmium and copper, and at least one element selected from the second group consisting of nickel, iron and cobalt, and

in a case where the alloy is expressed by a formula $M_x (Ni_{100-y} (Fe_{100-z} Co_z)_y)_{100-x}$ where M denotes the element selected from the first group, the composition x is in a range between 1 atomic % and 50 atomic %, the composition y is in a range between 0 atomic % and 50 atomic %, and the composition z is in a range between 0 atomic % and 100 atomic %, or in a case where the alloy is expressed by a formula $M_u (Co_{100-v} (Fe_{100-w} Ni_w)_v)_{100-u}$ where M

denotes the element selected from the first group, the composition u is in a range between 1 atomic % and 50% atomic %, the composition v is in a range between 0 atomic % and 50 atomic %, and the composition w is in a range between 0 atomic % and 100 atomic %.

Claim 3 (Currently Amended): ~~The magnetoresistance effect element according to claim 1~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein

the alloy includes aluminum, at least one element selected from the first group consisting of silver, gold, platinum, palladium, iridium, osmium and copper, and at least one element selected from the second group consisting of magnesium, calcium, silicon, germanium, boron, tantalum, tungsten, niobium, zirconium, titan, chromium, zinc, lithium and gallium, and

in a case where the alloy is expressed by a formula $(Al_{100-y}Q_y)_{100-x}M_x$ where M denotes the element selected from the first group and Q denotes the elements selected from

the second group, the composition x is in a range between 1 atomic % and 40 atomic %, and the composition y is in a range between 0 atomic % and 30 atomic %.

Claim 4 (Currently Amended): ~~The magnetoresistance effect element according to claim 1~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein

the alloy includes magnesium, at least one element selected from the first group consisting of silver, gold, platinum, palladium, iridium, osmium and copper, and at least one element selected from the second group consisting of aluminum, calcium, silicon, germanium, boron, tantalum, tungsten, niobium, zirconium, titan, chromium, zinc, lithium and gallium, and

in a case where the alloy is expressed by a formula $(\text{Mg}_{100-y}\text{Q}_y)_{100-x}\text{M}_x$ where M denotes the element selected from the first group and Q denotes the elements selected from the second group, the composition x is in a range between 1 atomic % and 40 atomic %, and the composition y is in a range between 0 atomic % and 30 atomic %.

Claim 5 (Currently Amended): ~~The magnetoresistance effect element according to claim 1~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein

the alloy includes silicon, at least one element selected from the first group consisting of silver, gold, platinum, palladium, iridium, osmium and copper, and at least one element selected from the second group consisting of magnesium, calcium, aluminum, germanium, boron, tantalum, tungsten, niobium, zirconium, titanium, chromium, zinc, lithium and gallium, and

in a case where the alloy is expressed by a formula $(\text{Si}_{100-y}\text{Q}_y)_{100-x}\text{M}_x$ where M denotes the element selected from the first group and Q denotes the elements selected from the second group, the composition x is in a range between 1 atomic % and 40 atomic %, and the composition y is in a range between 0 atomic % and 30 atomic %.

Claim 6 (Original): ~~The magnetoresistance effect element according to claim 1~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein the other of the first and second phases includes an magnetic element in higher concentration than the one of the first and second phases.

Claim 7 (Currently Amended): ~~The magnetoresistance effect element according to claim 6;~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein the other of the first and second phases includes an magnetic element in higher concentration than the one of the first and second phases, and

wherein the other of the first and second phases is dotted in the one of the first and second phases, and is forming a magnetic contact connecting the first and the second ferromagnetic layers.

Claim 8 (Currently Amended): ~~The magnetoresistance effect element according to claim 1,~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases,

wherein the alloy includes iron, and at least one element selected from the group consisting of molybdenum, magnesium, calcium, titan, zirconium, niobium, hafnium, tantalum, boron, aluminum and silicon, and

in a case where the alloy is expressed by a formula $M_{100-x}Fe_x$ where M denotes the element selected from the group, the composition x is in a range between 1 atomic % and 50 atomic %.

Claim 9 (Currently Amended): ~~The magnetoresistance effect element according to claim 1,~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases,

wherein the alloy includes nickel, and at least one element selected from the group consisting of molybdenum, magnesium, tungsten, titan, zirconium, niobium, hafnium, tantalum, boron, aluminum and silicon, and

in a case where the alloy is expressed by a formula $M_{100-x}Ni_x$ where M denotes the element selected from the group, the composition x is in a range between 1 atomic % and 50 atomic %.

Claim 10 (Currently Amended): ~~The magnetoresistance effect element according to claim 1,~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases,

wherein the alloy includes cobalt, and at least one element selected from the group consisting of molybdenum, magnesium, tungsten, titan, zirconium, niobium, hafnium, tantalum, boron, aluminum, chromium and vanadium, and

in a case where the alloy is expressed by a formula $M_{100-x}Co_x$ where M denotes the element selected from the group, the composition x is in a range between 1 atomic % and 50 atomic %.

Claim 11 (Currently Amended): ~~The magnetoresistance effect element according to claim 1,~~ A magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases,

wherein the phase separation layer has a lamination of a first layer and a second layer, the first layer includes a plurality of phases formed by a phase separation in a solid phase from a first alloy, and

the second layer includes a plurality of phases formed by a phase separation in a solid phase from a second alloy different from the first alloy.

Claims 12-18 (Canceled).

Claim 19 (Currently Amended): A magnetic head comprising a magnetoresistance effect element comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases

including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein the other of the first and second phases includes a magnetic element in higher concentration than the one of the first and second phases.

Claim 20 (Currently Amended): A magnetic reproducing apparatus which reads magnetic information in a magnetic recording medium, the magnetic reproducing apparatus comprising a magnetoresistance effect element for reading the magnetic information comprising:

a magnetoresistance effect film including a first ferromagnetic layer whose direction of magnetization is pinned substantially in one direction, a second ferromagnetic layer whose direction of magnetization changes in response to an external magnetic field, and an intermediate layer provided between the first and second ferromagnetic layers;

a pair of electrodes electrically coupled to the magnetoresistance effect film and configured to supply a sense current perpendicularly to a film plane of the magnetoresistance effect film; and

a phase separation layer provided between the pair of electrodes, the phase separation layer comprising a first phase and a second phase formed by a phase separation in a solid phase from an alloy including a plurality of elements, one of the first and second phases including at least one element selected from the group consisting of oxygen, nitrogen, fluorine and carbon in higher concentration than other of the first and second phases, wherein the other of the first and second phases includes a magnetic element in higher concentration than the one of the first and second phases.